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SUPPLEMENT

TO THE

JOURNAL

OF THE

AMERICAN ORIENTAL SOCIETY

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NUMBER 16 APRIL–JUNE 1953

THE PHONEMES OF ANCIENT CHINESE

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PUBLISHED BY THE AMERICAN ORIENTAL SOCIETY
20 Hopkins Place, Baltimore-1, Maryland

Price when sold separately.....$1.00

Entered as second-class matter, March 1, 1937, at the post office at Baltimore, Maryland, under the Act of August 24, 1912. Published quarterly.

This Supplement is issued with Volume 73, Number 2
of the JOURNAL

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THE PHONEMES OF ANCIENT CHINESE

1. Background.[1]

11. *Introduction.* Serious Chinese phonological study dates from the first few centuries A. D., when there developed the device of 'spelling out' through the use of two known characters the reading of a third one; this was called *fǎn-ch'ieh* 反切. Sūn Yén (pseudonym Shú-ján), compiler of the third-century work *Ěrh-yǎ yīn-ì*, is said to have been the first to make use of this key-word spelling system, in which the initial consonant is represented by the first or upper character, and the rest of the syllable—the 'final' with its tone—is indicated by the second or lower character. Before this time, the only method to indicate pronunciation was that of giving an exact or approximate homonym, with the notation *tú-jò* 讀如 'read as.' The *fǎn-ch'ieh* was something of a major discovery in its day, and since then the dichotomy of initial and final has dominated discussions of Chinese phonology.

12. *The work of Chinese historical phonologists.* The *fǎn-ch'ieh* readings are of interest to us today through their preservation in various dictionaries. The earliest of these recorded was *Yǜ P'ien*, 543 A. D., but this was preserved only in a corrupted form. Although later works refer to the *fǎn-ch'ieh* of this dictionary, these do not seem entirely reliable.[2] The most fruitful source for later scholars has been the rime dictionary called *Ch'ieh Yǜn*,

[1] This paper is the result of research undertaken in the writing of an M. A. thesis at the University of California under the guidance of Professor Y. R. Chao, for whose patient help and interest I am deeply grateful. I wish to express my appreciation for suggestions made by Professors Mary R. Haas and Peter A. Boodberg. The following typographical conventions are observed: Phonetic transcription is indicated by enclosure in brackets, phonemic transcription usually by enclosure in slant lines, except in places where the nature of the transcription seems obvious. Mandarin forms are cited in a slightly modified version of the Wade-Giles orthography, in which superfluous diacritics are omitted; Cantonese forms are cited in the orthography found in Y. R. Chao's *Cantonese Primer*. The symbol # represents zero in distribution charts.

[2] Bernard Karlgren, *Études sur la phonologie chinoise* (Leiden 1915-26), p. 29.

compiled in 601 by Lù Fă-yén and others. The original of this is not intact, nor is that of the 751 edition *T'áng Yŭn* by Sūn Mĭen, although the *făn-ch'ieh* of the latter are used by Hsŭ Hsŭan (916-91) in his edition of *Shūo Wén*. It is the Sùng edition known as (*Tà-Sùng ch'úng-hsīu*) *Kŭang Yŭn* which has been our chief source of information; this was compiled by Ch'én P'éng-níen, Ch'īu Yūng, and others, in 1008. An enlarged edition of *T'áng Yŭn* (itself an enlargement of *Ch'ieh Yŭn*), this Sùng edition seems to have kept fairly intact the rimes and *făn-ch'ieh* of the original 601 edition, as witnessed by fragments of this later discovered.[3] Other rime dictionaries reflect later stages of the language, and are of use in showing its development from the *Ch'ieh Yŭn* period. The principal ones are *Chí Yŭn* (and *Lĭ-pù Yŭn-lüeh*) by Tīng Tù (990-1053); *Wŭ-yīn Chí-yŭn* (1211) by Hán Tào-shāo; (*Kŭ-chīn*) *Yŭn-hùi* (before 1202) by Húang Kūng-shào — a work not extant, the rimes of which are found in the *Kŭ-chīn Yŭn-hùi Chŭ-yào* (1297) of Hsíung Chūng; *Chūng-Yŭan Yīn-Yŭn* (1324) by Chōu Té-ch'īng; *Húng-wŭ Chèng-yùn* (1375); and *Yīn-yŭn Ch'ăn-wéi* (1726).

13. *Traditional terminology.* Chinese phonologists have treated their study in three categories. *Kŭ-yŭn-hsŭeh* or 'study of old rimes' is research into the sounds of the pre-Hàn dynasties using as sources the rimes of the poetry classic *Shīh Chīng* and of *Ch'ŭ Tz'ú*, a collection of poetry made by Líu Hsìang (80-09 B. C.). *Chīn-yŭn-hsŭeh* or 'study of modern rimes' delves into the rime systems of Súi-T'áng and later times. *Tĕng-yŭn-hsŭeh*, in the narrow sense, is investigation of the arrangements and terms involved in the rime tables of Sùng times—which were in large part more explicit systematizations, in some cases modernizations, of the rimes in the *făn-ch'ieh* dictionaries; and, in the broader sense, includes the study of *făn-ch'ieh* relationships in general. It is the work of scholars of the latter two schools which are of primary interest to this discussion.

The Chinese phonologists abstracted from the 206 rimes in *Kŭang Yŭn* certain classes or 'groups' of rimes, which they called

[3] Henri Maspero, "Études sur la phonétique historique de la langue annamite," *BEFEO*, 12 (1912), 119-20. Karlgren, *Études sur la phonologie chinoise*, pp. 29-31.

shè 攝. There is a general dichotomy of the rimes into two *chŭan* 轉 or 'series' — called *nèi* 內 'inner' and *wài* 外 'outer' — the significance of which seems to lie in the quality of the nuclear vowel.[4] In the *Chīng-shĭh chèng-yīn Ch'ieh Yŭn chĭh-nán* (c. 1336) of Líu Chìen there are 16 of these *shè* groups, but in the earlier work *Ch'ieh Yŭn Chĭh-chăng t'ú* (1067?) only 13 groups were set up: in addition to the two pairs bracketed below, the group known as *kĕng* 梗 was combined with that called *tsēng* 曾, with one *shè* for each pair; the latter two, however, differ in their *chŭan* 'series' affinities. The examples which serve as tag names for the rime groups or *shè* are as follows:

Wài chŭan ('Outer series')		*Nèi chŭan* ('Inner series')	
1.	kŭo 果	10.	yŭ 遇
2.	chĭa 假	11.	chĭh 止
3.	hsìeh 蟹	12.	líu 流
4.	hsìao 效	13.	shēn 深
5.	hsíen 咸	14.	chēn 臻
6.	shān 山	15.	tsēng 曾
7.	tàng 宕	16.	t'ūng 通
8.	chīang 江		
9.	kĕng 梗		

Each of the various rime groups is cross-divided by four *tĕng* 等 or 'divisions,' which refer to the types of syllables comprised; these are further discussed in § 44. Each rime is subdivided by tone. There is further distinction between *hó-k'ŏu* 合口 'closed-mouth' finals, interpreted as those with medial lip action in the form of a vowel or semivowel, and *k'āi-k'ŏu* 開口 'open-mouth' finals — those without medial lip action. Within each of these groups, reference is sometimes made to *hsì* 細 'fine,' those with palatal medial, and *húng* 洪 'broad,' those without. These terms, later in origin than the preceding ones, are somewhat loosely applied, however, much as the English words 'soft' and 'hard.' The four types *k'āi*, *hó*, *húng*, and *hsì* are known collectively as *hū* 呼 or *tĕng-hū* 等呼 which might be translated 'medial status.' A com-

[4] Cf. Ló Ch'áng-p'éi, "On the meaning of Nèi and Wài Chŭan," *CYYY*, 4 (1933), 209-26.

bination of the possibilities give four medial types for syllables, and names were assigned these:

1.	zero = *k'āi*	開	'open'
2.	-w- = *hó*	合	'closed'
3.	-y- = *ch'i*(-*ch'ih*)	齊(齒)	'even(-teeth)'
4.	-yw- = *ts'ùo*(-*k'ŏu*)	撮(口)	'pursed(-mouth)'

The terms referring to syllable types with palatal medial were apparently not known before Sùng or Yűan times.[5] All these terms were studied by scholars of the Míng and Ch'īng periods, who worked out explanations for them.[6]

14. *Dialect evidence.* Other sources of knowledge about the Chinese of this period are the vast bodies of borrowed language forms known as Sino-Japanese, Sino-Korean, and Sino-Annamese (i. e., the Sino-Xenic dialects). During the latter part of the 19th and the early part of the 20th century, the analysis into phonetic terms of the available material was attempted by various scholars, among whom Pelliot and Maspero deserve particular credit. The main body of analysis was accomplished by Bernhard Karlgren, who took what he regarded as quasi-algebraic information contained in the *făn-ch'ieh* and the rime tables and reduced this to a phonetic system, the key to the values of which he found in a comparison of modern dialects. Karlgren regards the information contained in *Kŭang Yŭn* to be descriptive of a more or less homogeneous dialect spoken in the capital city of Ch'áng-ān around the sixth century A. D. Others feel the material to be more 'homogenized' — eclectic in nature, a sort of standardized national literary language normalized by the compilers. Compare the remarks in the introduction to *Ch'ieh Yŭn* (included at the beginning of *Kŭang Yŭn*): 'So we discussed the right and wrong of North and South, the understandable and unintelligible of ancient and modern, wanting to select the precise and discard the sloppy.' In the

[5] Wáng Lì, *Chūng-kúo yīn-yŭn hsűeh*, 2 Vols., Shanghai 1937, Vol. 1, p. 111, n. 5.

[6] Wáng Lì, Vol. 1, p. 158.

same vein, Maspero quotes from the opening remarks of the same introduction to the following effect:[7]

'Formerly, at the beginning of K'āi Húang (581-600) . . . Líu Chēn and others, in all eight persons, visited with me (Lù Fă-yén), and in the evenings we would sit with wine until the wee hours discussing the *yīn* (sounds) and the *yŭn* (rimes). Comparing their modern pronunciations they found differences; moreover not all the authors were in agreement in their choices. In Wú and Ch'ŭ, the pronunciation is too light; in Yĕn and Chào, too heavy. In Ch'ín and Lŭng, the going tone is pronounced like the entering tone; in Líang and Ì it is the even tone which is similar to the going tone. Furthermore (some authors) make single rimes out of 支 and 脂, out of 魚 and 虞; and 先 and 仙, as well as 尤 and 侯, were all regarded as the same *ch'ieh* (respectively). . . .'

15. *Historical and comparative studies.* In evaluating the work done and to be done in the field of Chinese linguistics, a clear distinction must be drawn between historical and comparative investigation. Thus far most of the work has been historical. In his 'reconstruction' of Ancient Chinese, Karlgren has produced a historical critique and systematization of the abstractions made by Lù Fă-yén and his colleagues as these abstractions are available to us in the texts; he has gone to the dialects with the comparative method only to find a key to express the sound classes thus revealed. Karlgren feels the language of *Ch'ieh Yŭn* to be the direct ancestor of most of the modern dialects; in general, Chinese linguists feel the relationship to be more avuncular. A complete comparative investigation of the dialects based on systematic correspondences, it is felt, should produce a reconstructed parent dialect sharing perhaps a common direct ancestor with the ancient dialect on which Karlgren has worked. Such a comparative investigation, however, must await more adequate description of the modern dialects.

Both Karlgren and Maspero feel there was another, related dialect in existence in the sixth century, that of Wú, which produced the Japanese readings known as *go-on* (i. e., *Wú yīn*), but they

[7] Henri Maspero, "Le dialecte de Tch'ang-ngan sous les T'ang," ***BEFEO***, 20 (1920), 110. And, further: '"Ah! le langage des habitants des neufs provinces n'est pas le même," s'écrie avec regret, au début du VII^e^ siècle, Yen Tche-t'ouei, et il parle immédiatement de l'opposition entre le parler du Nord et le parler du Sud.'

differ as to its bearing on Ancient Chinese. Maspero thought Sino-Korean came from this dialect, but Karlgren demonstrated[8] its closer relationship to the Northern dialect recorded in *Ch'ieh Yün*. Karlgren himself has recently admitted 'specifically that the Amoy and Swatow dialects show certain peculiarities that cannot be explained from the *Ch'ieh Yün* language.'[9]

Moreover, it is important to keep synchronic study distinct from diachronic investigation. It is a dubious venture to interpret one stage of a language largely by later and earlier stages, and then to explain these very stages by the structure so interpreted. Such circularity is especially troublesome in Karlgren's discussion of dentilabialization.[10] To a lesser extent, it also impairs the vowel system he sets up for the *Ch'ieh Yün* dialect: diachronic considerations of earlier and later periods sometimes outweigh considerations of synchronic structure.[11]

16. *Ancient Chinese and Archaic Chinese.* Karlgren calls his reconstruction of the dialect found in *Ch'ieh Yün* 'Ancient Chinese.' For a still younger stage of the language, that of about a thousand years earlier as spoken in the state of Chōu at the time

[8] In "The Reconstruction of Ancient Chinese," *TP*, 21 (1922), 1-42.

[9] Cf. Karlgren, Från Kinas Sprakvärld, Stockholm 1945, p. 45. This is quoted from a review in *TP*, 38 (1948), 320, which also quotes Paul Serruys, "Philologie et linguistique dans les études sinologiques," *Monumenta Serica* 8 (1943), 207, in opposition to Karlgren's belief in Ancient Chinese as the mother-tongue of the dialects. Serruys calls Karlgren's work 'une interprétation detaillée, admirablement étudiée et equilibrée dans toutes ses parties, du système phonétique d'un dictionnaire, du système tel que Lou Fa-yen l'a fixé en disposant les caractères en series d'initiales et finales.' See also the fine review by N. C. Bodman of the English translation of Från Kinas Sprakvärld, *Language*, 26 (1950), 339-46.

[10] Cf. Y. R. Chao, "Distinctions within Ancient Chinese," *HJAS*, 5 (1941), 223-7.

[11] The principal diachronic phenomena which have been observed in the development of the modern dialects (to varying extents in each) are these: 1. Dentilabialization of labials before certain finals. 2. Unvoicing of voiced aspirated consonants and development of distinctions of tonal register. 3. Palatalization of Ancient velar initials before certain finals. 4. Coalescence of final nasals. 5. Loss of -p, -t, -k (everywhere except in Southeastern dialects), then loss of the entering-tone class (as in Mandarin). 6. General raising of vowels.

of Confucius (550 B. C.) and before, Karlgren uses the name 'Archaic Chinese.'[12] The reconstruction of Archaic Chinese is based upon two sources: a study of the rimes in *Shīh Chīng* and an analysis of the phonetic hints contained in the structure of the logograms used for writing Chinese words. A major portion of the work done on this research has also been Karlgren's, although significant contributions have been made by others, notably by Western-trained Chinese linguists such as Ló Ch'áng-p'éi and Lǐ Fāng-kùei. Still older stages of the language, for which Karlgren suggests the name 'Proto-Chinese,' are indicated in the numerous 'word families' which may be discovered through interrelated graphic, phonetic, and semantic elements present in words which were already separate entities at the time of Archaic Chinese. Research in this field, prerequisite perhaps to adequate comparative work in the larger Sinitic field, has barely had a beginning.

It is the reconstruction of Ancient Chinese, however, which is of immediate relevance to this paper. Karlgren's analysis has been done largely from a strictly phonetic basis — the basis on which most theories of descriptive linguistics rested at the time he initiated his studies. His results have been accepted in the main as reasonable phonetic hypotheses by most Sinologists. The refinement of the phonemic principle in descriptive linguistics within the past few decades and its recent applications to Chinese suggest the desirability of a reinterpretation of the Karlgren reconstructions in the light of recent phonemic theory. This is the realm of the present investigation.

17. *The technique of phonemic analysis.* A phonemic description of a language differs from a phonetic one in several respects. The phonetic or articulatory description usually gives too many details of non-distinctive difference, and in this way often obscures those differences which are significant. The phonemic description, on the other hand, attempts to include all the distinctive features and exclude the non-distinctive ones, by correlating these with the definitional conditions of the distinctive features. In this way, each feature shows a definite and defined structural relationship to

[12] *Études sur la phonologie chinoise*, p. 32.

each of the other features. As a technique of analysis, the following phonemic criteria have proved of value:[13]

1. Complementary distribution. Phonetically differing subclasses known as 'allophones' which never contrast in position may be classed together.

2. Phonetic similarity. Each member of a phoneme shares a common defining characteristic or combination of characteristics absent from other phonemes in the system. These characteristics are determinable by either articulatory or acoustic analysis.

3. Distributional range. A phoneme is seldom an isolated 'occasional' unit; it usually has a range of distribution within the system not excessively at variance with that of other phonemes.

4. Structural pattern congruity. Phonetically parallel segments or sequences frequently have parallel distribution; where this distribution is lacking, it sometimes happens that a phonetically non-parallel segment or sequence stands in complementary distribution to one of the segments or sequences and may be included in the same phoneme, despite the criterion of phonetic similarity.

5. Non-linearity of sequence. Phonemes ordinarily follow one another in a more or less linear sequence, but sometimes phonemes overlap or occur simultaneously with one or more other phonemes. Many instances of linearization of phonemic sequences must be understood as somewhat arbitrary notational conventions. Others are based on the criterion of pattern congruity.

[13] On phonemic theory, cf. B. Bloch, "A Set of postulates for phonemic analysis," *Language*, 24 (1948), 3-47. For a somewhat different approach, cf. Zellig S. Harris, *Methods in structural linguistics* (Chicago, 1951). It should be noted in passing that the word 'phoneme' is used by French writers and by Karlgren in a general way synonymous with 'sound'; the word 'phonology,' often used by American scholars to cover the entire range of acoustics, phonetics, and phonemics, is restricted to the meaning 'phonemics' by European students of Trubetzkoy. British phonemicists prefer the term 'phonematic(s).'

18. *Phonemic analyses of Chinese dialects.* Phonemic theory has been applied to the analysis of the more important modern Chinese dialects with varying degrees of refinement. The prestige dialect of Peking has received especially wide attention, and various linguists have made significant contributions to the study of Pekinese phonetic data and the analysis of these into phonemes. At Yale certain ideas were suggested in the late thirties which culminated in the phonemicizations published by Hartman in 1944 and by Hockett in 1948.[14] Among the significant departures in Hartman's treatment is the positing of a 'general high syllabic,' whose distinctive feature is the highness of the vertical tongue position, with other features (front or back, rounded or unrounded) determined by phonemic environment. This allows the vowel system, at least for the isolated reading of most individual morphemes, to be stated neatly in terms of three syllabic nuclei: /i, e, a/. (Y. R. Chao later suggested the asterisk as a less compromising symbol for the high syllabic.) Hockett's study is somewhat more detailed, and differs from Hartman's mainly in point of departure. Hockett considers, as it were, the minimal tone abstraction (we might say 'tonable') as more basic than Hartman's undefined syllable; he is able in this way to postulate a unit requiring no distinctive vowel, substituting zero for Hartman's minimal syllabic. The essential difference is of scope, terminology, and presentation.

19. *Phonemicization of Ancient Chinese.* The 1941 article by Y. R. Chao, "Distinctions Within Ancient Chinese," *HJAS* 5 (1940), 203-33, is the principal examination of Karlgren's study made from phonemic premises, and forms the point of departure for the present paper. Chao keeps rather close to the Karlgren notation, retaining its occasional phonemic superfluities as 'luxury notations.' He does, however, make it plain that the so-called 'yodized' labials, dental liquids, and gutturals were probably not distinct from their corresponding 'pure' forms. With the gutturals (and Karlgren uses this term to cover velar and glottal sounds, including vocalic onset), Chao's identification makes it necessary to class Karlgren's 'consonantic yod' as an allophone of

[14] Lawton M. Hartman 3d, "The Segmental phonemes of the Peiping dialect," *Language*, 20 (1944), 28-42. Charles F. Hockett, "Peiping phonology," *JAOS*, 67 (1947), 253-67.

the voiced velar fricative /γ/, with which it is in complementary distribution and has certain dialect and textual affinities. In his article, Chao reduces Karlgren's consonantic and vocalic varieties of *i* and *u* to single phonemes respectively, and points out the circularity of Karlgren's conditions for later dentilabialization: 'primary' versus 'secondary' *hó-k'ŏu* or '-w-' of labials. He also notes the probable phonemic affinity of the lone final ång with the vowel /a/ and suggests the need for a closer re-examination of the vowel system as a whole.

2. Tones.

21. *Traditional classifications.* The classification known as *Szù Shēng* 'Four Tones' has been traditional since the days of Shĕn Yŭeh (441-513 A. D.), who is usually credited with the discovery of these classes.[15] The tones were called *p'íng* 'even,' *shàng* 'rising,' *ch'ù* 'going,' and *jù* 'entering.' The last three are often grouped together in the expression *tsè* 'oblique' as contrasted with the even. From a study of the historical evolution of the tones we observe that complex systems of contours and registers such as those found in certain of the modern dialects have developed from rather modest beginnings. The double register (high and low) became distinctive as a result of the unvoicing in most modern dialects of the ancient voiced stops. In Mandarin this development of register is systematically evident only in the so-called 'second' tone, which is the low-register variety of the even tone.

It should be emphasized that the four-tone classification made by Shĕn Yŭeh and his fellow phonologists of the Líang dynasty happened to be a quasi-phonemic abstraction, representing classes

[15] Before this time there was a system of classification known as *Wŭ Yīn* 'Five Sounds,' which may have been a reference to the four tones with a difference in treatment for voiced and voiceless initials in at least one of the tones (perhaps indicating a tonal allophone — Karlgren seems to feel the allophones were present for all the tones at that time). The exact nature of the *Wŭ Yīn* relationship is not clear, but it had nothing to do with the division into two volumes of the even-tone section of *Ch'ieh Yùn*; this was simply due to a surplus of words in that tone. Cf. Wáng Lì, Vol. 1, pp. 96, 174-5, 219. Symbols designating the Five Sounds (used also for the pentatonic scale in Chinese music) are *kūng* 宮, *shāng* 商, *chŭeh* 角, *chĭh* 徵, and *yŭ* 羽.

of contours rather than actual contours themselves. These, the quasi-phonetic values of the contour classes in Ancient Chinese, we have no way to know. But the existence of the contour classes is well attested by later development in the modern dialects. It is true the names by which these classes have been known since the Líang dynasty are quite descriptive in themselves: 'even, rising, going, entering.' But it is probable that these names were selected with semantic criteria in mind only secondarily, if at all, and the primary consideration was that the words exemplified in their own Ancient tones the classes to be named.[16] Beyond that, we have only such belated traditional descriptions as the impressionistic ones in the introduction to the 17th-century K'āng Hsī dictionary: 'The even tone is spoken evenly with no rise or fall. The rising tone is spoken high, fierce and strong. The going tone is clearly distinguished, mournful and distant. The entering tone is short, quick and abruptly shut off.'[17]

We know that the tone classes cut across several dialects at the period of Ancient Chinese, as witnessed by the remarks in the introduction to *Ch'ieh Yün* quoted earlier. Maspero also quotes the statement of a 9th-century writer Kù Chāi-chīh: 'The people of Ch'ín pronounce the going tone like the rising tone, and those of Wú the rising tone like the going tone.'[18] This has the familiar ring of friendly banter between natives of Peking and Chungking on the meaning of *mǎi* 'buy' and *mài* 'sell.'

22. *The entering tone.* Although Shěn Yüeh found four tone classes, his fourth class — the entering tone — consists entirely of words we are sure must have ended in final stops, voiceless and probably unreleased.[19] By speaking of these words as a separate tone class, it is possible to group the stop endings neatly with the

[16] This mnemonic usage of a suggestive example as a class name is a frequent neologistic device of Chinese phonologists. Note the use of *hsì* and *húng* for palatal and non-palatal medial respectively. Karlgren seems unaware of this; cf. *Études sur la phonologie chinoise*, pp. 43, 382 (bottom).

[17] Apparently of Míng origin. Cf. Wáng Lì, Vol. 1, p. 94.

[18] Maspero, "Le dialecte de Tch'ang-ngan sous les T'ang," p. 110.

[19] Maspero, however, following Pelliot, thought the endings were voiced fricatives which possibly became stops in sandhi. Cf. "Le dialecte de Tch'ang-ngan sous les T'ang," pp. 41-4. Cantonese -k after a short vowel is sometimes [g] or [γ].

corresponding nasals (-p with -m, -t with -n, -k with -ng). But since no other tone occurred with words ending in a stop, this class was actually in complementary distribution with one of the other classes—or, it might be suggested, equally with all of them. If this entering tone was phonetically more similar (in contour or register) to some one class than to the other two, it was probably one of the oblique tones—the rising or the going.[20] Perhaps the traditional order of listing the tones indicates the entering tone was felt to have a closer affinity to the going tone. On the other hand, it may simply show that the Líang phonologists recognized something unusual, defective, non-phonemic about this class and so relegated it to final position.[21]

Treatment in modern dialects varies. In literary Cantonese the entering tone is in the majority of instances clearly an allophone of the going tone, but in the colloquial one additional class must be accounted for because of a number of contrasting words. In some dialects which do not preserve the final unreleased stops, the entering tone still maintains its integrity: in some instances it is marked by a glottal stop, in others not even by this. In Mandarin the tone has split up among the other three, largely depending on the Ancient phonemic environment, as though it had indeed been a 'neutralized' phoneme of some sort.

In any event, there is no need to commit ourselves on the exact phonemic class into which the entering tone should fit; the distinctive endings are adequate for notational purposes. But, given the validity of the final stops, we can say there were perhaps but three phonemic tones in Ancient Chinese.

Apparently there were three tones in Archaic Chinese as well, although many of the later going-tone groups ending in semivowels (-y, -w) were derived from Archaic endings Karlgren postulates

[20] Yet in *Ch'ieh Yün Chih-chăng T'ú* the entering tone is included with the even tone of the corresponding nasal finals. (Cf. Wáng Lì, Vol. 1, p. 102.)

[21] The 17th-century scholar Kù Yén-wŭ (1613-82) says '. . . before 520 A. D. going and entering tones were often used interchangeably.' (Wáng Lì, Vol. 1, p. 95.) K'ŭng Kŭang-sēn (1752-86), author of *Shīh Shēng-lèi*, thought there was no entering tone in Archaic Chinese and placed the words which later had the entering tone with the going tone of the corresponding nasal endings. Cf. Wáng Lì, Vol. 2, Addenda 9.

as voiced stops (mainly -d and -g). It would not seem out of the question to speculate that the remaining groups in the going tone may earlier have been distinguished by some non-prosodic aspect, leaving a simple two-contour system of even and oblique.

3. Initials.

31. *Traditional list.* There are 36 initial classes or categories in the rime tables, and *Yǜn Chìng* (1161) first referred to them by name. Until recently it had been traditional to attribute the origin of the 36 to the T'áng shaman Shŏu Wēn. But in the *Tūn-húang tò-sŏ* 敦煌掇瑣 (Academia Sinica) p. 421, No. 100, there is a list of initials by Shŏu Wēn which lacks the four labiodentals, the initial *níang*, and the initial *ch'úang*, but separates the apparently yodized initial *chǖn* from *chìen*, thus making a total of 31. Whatever the circumstances of the later additions and changes in the representative characters, the traditional practice of the Chinese phonologists has been to treat the 36 initials contained in *Yǜn Chìng* and subsequent works as the standard way of talking about the Ancient initials down to our day.[22] These initials, together with Karlgren's notations, are listed below.

I.	yá-yīn	牙音	(velars)	
	1. chìen	見		k
	2. hsī (ch'ī)	溪		k'
	3. ch'ǘn	羣		g'
	4. í	疑		ng
II.	shé-t'óu	舌頭	(apicals)	
	5. tūan	端		t
	6. t'òu	透		t'
	7. tìng	定		d'
	8. ní	泥		n

[22] It should be noted that *Kŭang Yǜn* did not distinguish the labiodental class from the preceding labial class; there were only 32 initial categories in this work. Karlgren thinks the labiodentals were established by the time of *Ch'ieh Yǜn*, the data of which reflects a somewhat earlier stage of the language throughout. The so-called *Shè Lì sān-shíh-ī tzù-mŭ* did not include in its thirty initials the labiodentals, nor items 12 and 28. Cf. Wáng Lì, Vol. 1, pp. 65-76.

III.	shé-shàng	舌上	(palatal stops)
	9. chīh	知	t̂
	10. ch'è	徹	t̂'
	11. ch'éng	澄	d̂'
	12. níang	娘	ń
IV.	chùng-ch'ún	重脣	(bilabials)
	13. pāng	幫	p
	14. p'āng	滂	p'
	15. pìng	竝	b'
	16. míng	明	m
V.	ch'īng-ch'ún	輕脣	(labiodentals)
	17. fēi	非	(p)
	18. fū	敷	(p')
	19. fèng	奉	(b')
	20. wéi	微	(m)
VI.	ch'īh-t'óu	齒頭	(apical sibilants)
	21. chīng	精	ts
	22. ch'īng	清	ts'
	23. ts'úng	從	dz'
	24. hsīn	心	s
	25. hsíeh	邪	z
VII.	chèng-ch'īh	正齒	(retroflex or palatal sibilants)
	26. chào	照	tś, tṣ
	27. ch'ūan	穿	tś', tṣ'
	28. ch'úang	牀	dź', dẓ'
	29. shěn	審	ś, ṣ
	30. shàn	禪	ź
VIII.	hóu-yīn	喉音	(gutturals)
	31. yǐng	影	· (glottal stop)
	32. hsĭao	曉	x
	33. hsía	匣	ɣ
	34. yǔ	喻	– (vocalic onset)
IX.	pàn-shé	半舌	(lateral)
	35. lái	來	l
X.	pàn-ch'īh	半齒	(naso-palatal sibilant)
	36. jìh	日	ńź

32. *Karlgren's system.* Karlgren recognized eleven more initial types, distinguishing palatalized or 'yodized' labials, gutturals, and liquids where the *tzù-mŭ* **字母** representing the initial cate-

gories did not. Thus he sets up what amounts to a system of forty-seven initials, which may be arranged as follows (the symbols are used as in Grammata Serica):

LABIALS, PURE:	p	p'	b'			m		
YODIZED:	(pj	p'j	b'j			mj)		
DENTAL STOPS:	t	t'	d'					
DENTAL LIQUIDS, PURE:						n	l	
YODIZED:						(ń	lj)	
DENTAL SIBILANTS:	ts	ts'	dz'	s	z			
PALATAL STOPS:	t̂	t̂'	d̂'					
RETROFLEX SIBILANTS:	tṣ	tṣ'	dẓ'	ṣ				
PALATAL SIBILANTS:	tś	tś'	dź'	ś	ź	ńź		
GUTTURALS, PURE:	k	k'		x	γ	ng	i̯	· (glottal stop)
YODIZED:	(kj	k'j	g'j	xj		ngj	j	· j)

Karlgren felt the need to set up the yodized labials, liquids and gutturals because of a difference in *fǎn-ch'ieh* treatment. Chao has explained this difference in another manner. He assumes the yodized rows in parenthesis were in complementary distribution respectively with the rows immediately above: g'j is equated with g' and j is equated with γ(i̯).[23] This then reduces the number of initials to 35, since the yodized ń was already included in the traditional *tzù-mǔ* list; the list is further reduced to 31 when we subtract the labiodentals, which did not form a distinct class within Ancient Chinese.

Chao also points out the nearly complementary distribution of the dental and palatal stops. Minimal contrasts in a handful of very common words, however, require the distinction to be kept, unless we posit some coexistent or subsidiary phonemic system to account for these contrasts.[24] Ló Ch'áng-p'éi suggests two allo-

[23] Y. R. Chao, "Distinctions within Ancient Chinese," pp. 205-15. Cf. Ló Ch'áng-p'éi, "Evidence for amending B. Karlgren's Ancient Chinese *j* to γ," *HJAS*, 14 (1951), 285-90.

[24] Y. R. Chao, "Distinctions within Ancient Chinese," pp. 208-9. The Hindu grammarians noticed a similar situation in Sanskrit, where the dental, palatal, and retroflex nasals were in complementary distribution except for a handful of non-conditioned occurrences of the retroflex variety which formed non-minimal contrasts. Cf. Murray B. Emeneau, "The Nasal Phonemes of Sanskrit," *Language*, 22 (1946), 86-93, esp. pp. 88-9.

phones for the palatal stops and nasal: a retroflex variety before finals of Type II (see below), and a palatal one elsewhere.[25]

The glottal stop is distinctive only before finals of Type III (those beginning with Karlgren's i̯). In this position, however, the distinction must be maintained.

33. *The voiced aspirates.* Karlgren treats the phonemes x and γ as velar fricatives. They may just as readily have had glottal allophones [h] and [ɦ].[26] Such an interpretation is favored by the glottal nature of the corresponding phonemes in the Wú dialects and in Cantonese. Even with a velar hypothesis, many phonemicists would analyze the voiceless aspirated initials as consonant plus /x/; compare Hockett's treatment of Mandarin, where the phoneme in question is indisputably velar. The voiced aspirated consonants could be analyzed in a like manner (e. g. /bx/); but phonetically the aspiration as well as the consonant would be voiced. It would be possible to consider the /x/ as having a voiced allophone conditioned by the preceding voiced consonant; it is simpler to relate the aspiration to the existing voiced velar or glottal fricative /γ/. We then have the possibility that the voiced consonants need not be considered separate phonemes within Ancient Chinese. Rather, the voicing in question is an allophone of the voiceless phoneme conditioned by the following voiced fricative (e. g. /pγ/). This immediately reduces the system by eliminating seven phonemes. Moreover, it brings Ancient Chinese into closer line with the modern Wú dialects, whose 'voiced consonants' were in large measure responsible for the reconstruction of voiced initial stops in Ancient Chinese. A close examination of these initials in many of the Wú dialects shows them voiced only in sandhi — after pause they are voiceless consonants followed by the voiced glottal fricative [ɦ].[27] If we accept the phonemic treatment /pγ/

[25] Ló Ch'áng-p'éi, "The Ancient pronunciation of initials *shīh, ch'è, ch'éng, niang*," *CYYY*, 3 (1931), 121-57.

[26] Cf. Wáng Lì, Vol. 1, p. 69, n. 2. Karlgren discusses the question of glottal versus velar at length (*Études sur la phonologie chinoise*, pp. 379-84). One of his arguments against the glottal interpretation is that Sino-Japanese represents these initials by k; but would this be so surprising, since Japanese /h/ at that time was undoubtedly a labial?

[27] Y. R. Chao, *Studies in the modern Wu-dialects* (Peking 1928), pp. 27-8; also p. xii. See now George A. Kennedy, "Voiced gutturals in Tangsic," *Language*, 28 (1952), 457-64.

etc. for Ancient Chinese and consider the voicing of the initial a determined feature conditioned by the voiced fricative, then the statement for the correspondence to modern Wú is simply Ancient Chinese /ɣ/ : Wú /ɦ/. And the statement of correspondence to dialects like Mandarin can—with various modifications—be made as Ancient Chinese /ɣ/ : Mandarin /h/. Were it not for the recent discovery of Hú-nán dialects with true voiced initials,[28] it might seem advisable to push even the phonetic interpretation of initial stop voicing back to the period of Archaic Chinese, when final voiced stops were perhaps also in the system.

34. *The naso-palatal fricative.* One other reduction is now possible. The initial ńź occurs with the palatal finals of Type III. It is possible to interpret this initial as phonemically complex /nɣ(i̯)/ without revising Karlgren's phonetic interpretation of 'nasal-oral homorganic fricative.' This treatment is favored by the fact that the initial comes from a postulated Archaic *ń, which corresponds to the Ancient /n/ allophone preceding i̯. Chao has already, following up a theory of Kŏ Ì-ch'ĭng, assigned Karlgren's initial palatal fricative [j] to the /ɣ/ phoneme in this position, without phonetic reinterpretation.[29]

In addition, the initials z and ź might be reinterpreted as /sɣ/ and /śɣ/, with the voicing a conditioned feature. In such a case it might seem feasible to consider s as /sx/. But while modern Wú [sɦ] does correspond to Ancient z, Ancient s corresponds to Wú [s].

35. *Phonemic interpretation of the initial system.* Application of the above suggestions would reduce the initial system to an arrangement of 17 consonant phonemes, for which the following orthographic representation is suggested. (Digraph ng and digraphs with j and r are considered unitary phonemes; in other cases, two letter symbols represent a sequence of two phonemes. For ɣ is substituted ɦ; for x, h.)

The zero (0) represents non-distinctive vocalic onset or 'smooth ingress.'

[28] F. K. Li, "Languages and dialects," *The China Yearbook*, 1938-9 issues, Shanghai 1939, pp. 43-51.

[29] "Distinctions within Ancient Chinese," pp. 211 ff.

Labials:	p	ph	pɦ			m		
Dentals:	t	th	tɦ			n	l	
	c	ch	cɦ	s(h)	sɦ			
Palatals:	tj	tjh	tjɦ					
	cr	crh	crɦ	sr				
	cj	cjh	cjɦ	sj	sjɦ	nɦ		
Gutturals:	k	kh	kɦ	h	ɦ	ng	(0)	q (glottal stop)

Chinese phonologists refer to four classes of initial consonants:

ch'üan-ch'ing 全清 'fully clear' = unaspirated voiceless stops

tz'ù-ch'ing 次清 'semi-clear' = aspirated voiceless stops (and, in later usage, voiceless continuants)

ch'üan-chó 全濁 'fully muddy' = aspirated voiced stops and voiced fricatives

tz'ù-chó 次濁 'semi-muddy' = voiced continuants (nasal, lateral, and smooth ingress)

4. Finals.

41. *Homogeneity of the data.* The large number of rime distinctions made in *Kŭang Yŭn* has occasioned suspicion the material it presents may be of a diachronic, diaphonic nature, rather than of a homogeneous dialect. Thus Tài Chèn (1723-77) attributes the complexity of distinctions to the inclusion of older and later divergences; Chāng Pĭng-lín (1868-1936) to inclusion of the same sort of material and also to incorporation of regional variants.[30] So it may be that *Kŭang Yŭn* has achieved an artificial maximum of distinctions never possessed by any of the living dialects from which it was drawn. Karlgren[31] offers a different explanation:

> On doit observer aussi que les rimes du Ts'ie Yun n'ont pas été, même sous les T'ang, des rimes de poésie: dans la poésie on rimait beaucoup plus librement. Les rimes du Ts'ie Yun sont établies par un linguiste (ou plusieurs?) extrêmement entrainé, et celui-ci a enregistré toute nuance d'intérêt étymologique même très délicate, afin de construire une clé aussi souple et commode que possible à son dictionnaire arrangé d'après les finales.

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[30] Wáng Lì, Vol. 1, p. 243.

[31] *Études sur la phonologie chinoise*, p. 690.

So the rimes may be considered to make more distinctions than phonemically necessary; and all the more, when we consider that even poet's rimes do not always recognize the phonemic affinity of two allophones. Karlgren's assumption [32] that a difference in medial alone would never be reflected in a difference of rime is open to criticism. It seems quite probable the same phoneme would divide into different rimes where allophones conditioned by medials or other phonemic environment would make sufficient phonetic difference. Note that *Kŭang Yŭn* makes separate rimes of Karlgren's ân and uân, but the *Ch'ieh Yŭn* fragments include these in the same rime.

Since *Ch'ieh Yŭn* is presumably a record of one point (or several nearby points) along the path of development of the Chinese dialects, we may expect the language within it to be subject to the same structural pressures of distribution, complementation, and patterning as any living tongue.

42. *Karlgren's vowels.* Karlgren presents an elaborate system of fifteen vowels; four of these are posited as short forms of other vowels, leaving eleven presumably distinctive vowel qualities. The vowels are presented below in the form used by Karlgren in Grammata Serica, with notational revisions similar to those made by Y. R. Chao in his Distinctions Within Ancient Chinese: ʌ for the inverted ɑ; for the labial vowel, use of u (1) before â, â o, ə when not preceded by i, (2) when final—elsewhere use of w; use of subscript dot instead of breve for the short front-central low vowel (ạ instead of ă); breve over instead of under short ĕ; omission of breve under ə. The arrangement—left, right, top, bottom—is in accordance with the position of the tongue: front, back, high, low, respectively.

i, i̯ u
e, ĕ o
ə
ä
ɛ ʌ å
a, ạ â, â̤

[32] *Études sur la phonologie chinoise*, p. 79 and elsewhere.

The values these symbols represent in the more familiar terms of the International Phonetic Alphabet are as follows.[32a] Note the conflict of the symbol ɛ in the two systems.

i:, i		u
e:, e		o
	ə	
ɛ		
æ	ʌ	ɔ
a:, a		ɑ:, ɑ

43. *Syllable structure.* In setting up a phonemic analysis, it is often advantageous to consider the syllable structure based on a vocalic nucleus. Even in a phonemicization such as that of Hockett for the Peking dialect, which seems almost to discard vowel nuclearity in favor of tone nuclearity, the presence of a sort of zero vowel to 'carry the tone' is implied in the description of semivowels and what Hockett calls 'semiconsonants.' As it stands at present, Karlgren's interpretation of the Ancient Chinese syllable may be abstracted as follows:

$$\frac{\text{T}}{\text{(C)}\ \ \text{(V)}\ \ \text{(V)}\ \ \text{V}\ \ \text{(V, C)}}$$

That is, leaving aside the tone (T) and the initial consonant, the nucleus of the syllable consists of from one to four vowel-like phonemes. (For the moment, we include Karlgren's w and short i̯ with the vowels.) Karlgren does not dwell further on nuclearity within this vowel sequence; he does, however, speak of voyelle principale or 'head vowel' (*Phonologie*, p. 72), and he seems to be indicating a nuclear preference in writing some vowels as short and using the symbol w to represent a sort of 'consonantic' u. In the final -i̯wo we may presumably consider the nuclear vowel to be o, preceded by two high non-nuclear vowels we might consider as semivowels /y/ and /w/. Similarly in the final -i̯ang, we may consider the structure to be SV V C. Where Karlgren writes long i and long u (except following some other vowel in syllable-final position), we are apparently to take those vowels as nuclear and consider any short vowels within the syllable as non-nuclear. The two short non-nuclear vowels which occur contiguous to i and u are ĕ and ə (Karlgren considers ə 'intrinsically

[32a] But ʌ is usd for the inverted a of IPA.

short'); it is difficult to interpret either of these as a semivowel when it occurs contiguous to a more close vowel. In addition there are nuclear clusters consisting of two long vowels, the first of which is always i or u (e. g., -uan, -uo, -ien), and these clusters are sometimes split by a semivowel (-iwen) giving a dissyllabic appearance. However, short vowels which appear as the only vowel must be taken as nuclear (-ən) and there are short-vowel clusters (-i̯ĕn, -i̯ən).

In all clusters of short and long vowels, one of the elements is a high vowel (i or u). It therefore seems feasible to shift the burden of nuclearity, for phonemic purposes, to the non-high vowel and consider the high vowel as a semivowel /y/ or /w/. This will reduce all the above instances to the pattern of (SV) (SV) V — with the exception of 'long i and u' with contiguous short vowels ĕ and ə, i. e. -iĕ, -i̯uĕn, -uən, etc. Somewhat ambiguous are the cases of -əu and -(i̯)ĕi (which Chao reinterprets as -i̯əi, a reinterpretation Karlgren has accepted); consideration of the high vowel in each case as a non-nuclear final seems determined by pattern. As to the length involved, Karlgren sets up vowel quantity distinctions in Ancient Chinese largely on the basis of quality distinctions in modern dialects. Under such circumstances, for our purposes of charting distribution, it would seem better to ignore the possible length factor (phonemically non-distinctive) in these cases of long i and u with contiguous short vowels, and treat the i and u as semivowels in the same manner as above.

Some further difficulties, however, are presented by the final -i̯wiĕ, which brings three high vowels together to make a cluster /ywy/ in the present treatment. It is true that in Karlgren's original version, the first /y/ element really belongs with the initial (except after glottal stop, where it might be so interpreted as well: 'yodized glottal stop') and the final is -wiĕ; even this presents a unique sequence /wy/. Under the Chao reinterpretation of complementary distribution between the palatalized and non-palatalized labials, dental liquids, and gutturals, it is necessary to relegate the palatal phoneme to the final, thus producing the anomaly of SV SV V V, or in the present treatment SV SV SV V. To resolve this to a pattern which dovetails with all the others will require the omission of the third element, i. e. a reinterpretation to -i̯uĕ or in quasi-phonemic form -ywĕ. With such a

treatment, this final jibes more consistently with the corresponding *k'ai-k'ou* final -iĕ (cf. -i̯ən, -i̯wən).

It should be noted that considering the non-nuclear high vowels as 'semivowels' in a phonemic sense does not necessarily place in question the vowel-like nature of the articulation. In the Peking dialect the semivowel in /cya/ (Wade-Giles *chīa*) 'house' is given a distinctly vowel articulation. There is a lyrical style of Chinese dramatic music called *k'ūn-ch'ŭ* which 'holds' (prolongs) the so-called medial vowels rather than the nuclear ones; to a somewhat lesser extent this is noticeable also with the two common types of dramatic melody *hsī-p'í* and *èrh-húang* (together called *p'i-húang*). In fact, the only singing which prolongs the nuclear vowels is that of the occidental-inspired schools.[33]

Note, too, that phonetically both the high vowels in each of the Peking sequences /yew/ and /wey/ (Wade-Gile's yu, -iu and wei, -uei, -ui) are perceptibly longer than the nuclear vowel, particularly in the first and second tones. And consideration of Karlgren's -uən [uᵊn] as /-wən/ is quite parallel to the Peking final /wen/ (Wade-Giles -un), of which the phonetic realization in the two high tones is [uᵊn], e. g. *hūn* 'twilight,' *hún* 'soul.' Karlgren himself has indicated better than any other investigator the scope of this phonetic variance of 'audible prominence' in his discussion "The Distribution of stress within the syllable" in the detailed introduction to *A Mandarin phonetic reader*, Stockholm 1918, pp. 58-62.

In other words, we are using the term semivowel to mean phonemically non-nuclear high vowels, thus allowing retention of Karlgren's non-distinctive phonetic interpretations while placing them in a more consistent structure for phonemic analysis. In writing the semivowels as /y/ and /w/, we make this explicit; later it is possible to use the symbols i and u for these phonemes, just as Hockett uses them in his notation of the corresponding Mandarin phonemes.

When Chao suggested putting Karlgren's two varieties of i and u respectively into one phoneme each, he posited two allophones for /i/ in order to explain the diffference in *făn-ch'ieh* treatment under the 'medial harmony' hypothesis which replaced Karlgren's

[33] Information through the courtesy of Y. R. Chao.

hypothesis of a distinct series of 'yodized' (palatalized) initials:[34]

[ɪ] (more open) — before unmodified (long) e, or final after vowel or diphthong;

[i] (more close) — when alone or before ĕ or vowels other than long e.

There is no reason these allophones may not have existed also in those instances subject to a phonemic treatment as semivowel or non-nuclear vowel: there are distinct allophones in Mandarin /cyaŋ/ [tśⁱɑŋ] (Wade-Giles chiang) and /lyaŋ/ [lⁱɑŋ] or even [lᵉɑŋ] (Wade-Giles liang).

We now have a scheme for the phonemic structure of the Ancient Chinese syllable more parallel to that of Mandarin and other modern dialects:

$$\frac{\text{T}}{\text{(C) (SV) (SV) V (C, SV)}} \quad \text{i. e.} \quad \frac{\text{1, 2, 3, 4}}{\text{(C) (y) (w) V (C, y, w)}}$$

It is within the frame of this pattern that we shall further investigate the vowel classes.

44. *Tĕng: Syllable-class and final-class 'divisions.'* With the phonemic nuclearity decided, we are now ready to chart the distribution of the vowels within the system of finals. In the tables below, the column on the extreme right shows the 'division' or *tĕng*, reflecting the types of initials which occur with the finals in question; when the row of finals is not uniform, the division is marked individually for each final. It should be noted that these divisions do not correspond strictly to the *tĕng* of the rime tables, which applied to word-units or syllables as a whole, with the initial and final considered together. Karlgren used the division numbers of the Sùng rime tables, but supplemented them with subscript Greek letters to indicate, within all but the first of the divisions, the classes of finals occurring with types of initials. Class α occurs only after palatals (in the broad sense, including retroflex) or palatalized labial, dental liquid, and guttural initials; class β only after labials and gutturals; and class γ after all types of initial except palatals. Karlgren's α-class (referring, as always, to finals)

[34] "Distinctions within Ancient Chinese," p. 214.

thus occurred in both divisions II and III (referring, in Sùng usage, to syllables as a whole). Chao took the rime-table division numbers and used them to represent the classes of finals, by shifting the α-class elements in division II to division III, and splitting this enlarged and 'final-referring' division into IIIα and IIIβ. In other words, the finals of originally IIα syllables are called IIIα finals. The γ-class of finals coincides completely with division IV of the syllables and so the term 'γ-class' becomes superfluous. The constituency of the division classes in these two usages (for syllable on the one hand and for final on the other) may be illustrated in a table:

Traditional *tĕng* (Syllable-class)	Karlgren (Final-class)	Chao (Final-class)
I	–	I
II	–, α	II
	α	IIIα
III	β	IIIβ
IV	γ	IV

The types of initial occurring with final classes are shown in the following table:

	α	β	γ (IV)
Labial	x	x	x
Dental	x*	–	x
Palatal	x	–	–
Guttural	x	x	x

*(rare with stops)

45. *Distribution of Karlgren's vowels.* In the distribution charts below, the final consonants /p, t, k/ are implied in the columns /m, n, ng/ respectively. An asterisk marks changes in the original Karlgren interpretation made by Y. R. Chao in Distinctions Within Ancient Chinese; these do not complicate the distribution patterns in any way.

	/-y/	/-w/	/-m/	/-n/	/-ng/	/-#/	(Division)
i							
/#-/	–	–	–	–	–	–	
/w-/	–	–	–	–	–	–	
/yw-/	–	–	–	–	–	i̯wi	IIIα
/y-/	–	–	–	–	–	i, i'	IIIα
ĕ							
/#-/	–	–	–	–	–	–	
/w-/	–	–	–	–	–	–	
/yw-/	–	–	–	i̯uĕn	–	i̯wiĕ	IIIα
/y-/	–	i̯ĕu*	–	i̯ĕn	–	iĕ	IIIα
e							
/#-/	–	–	–	–	–	–	
/w-/	–	–	–	–	–	–	
/yw-/	iwei	–	–	iwen	iweng	–	IV
/y-/	iei	ieu	iem	ien	ieng	–	IV
u							
/#-/	–	–	–	–	ung	–	I
/w-/	–	–	–	–	–	–	
/yw-/	–	–	–	–	–	–	
/y-/	–	–	–	–	i̯ung	i̯u	IIIα
o							
/#-/	–	–	–	–	–	–	
/w-/	–	–	–	–	uong	uo	I
/yw-/	–	–	–	–	i̯wong	i̯wo	IIIα
/y-/	–	–	–	–	–	–	
ä							
/#-/	–	–	–	–	–	–	
/w-/	–	–	–	–	–	–	
/yw-/	i̯wäi	–	–	i̯wän	i̯wäng	–	IIIα
/y-/	i̯äi	i̯äu	i̯äm	i̯än	i̯äng	–	IIIα
ạ							
/#-/	ại	–	ạm	ạn	–	–	II
/w-/	wại	–	–	wạn	–	–	II
/yw-/	–	–	–	–	–	–	
/y-/	–	–	–	–	–	–	
a							
/#-/	ai, ai'	au	am	an	–	a	II
/w-/	wai, wai'	–	–	wan	–	wa	II
/yw-/	–	–	–	–	i̯wang	–	IIIα
/y-/	–	–	–	–	i̯ang	i̯a	IIIα

	/-y/	/-w/	/-m/	/-n/	/-ng/	/-#/	(Division)
ậ							
/#-/	ậi	–	ậm	–	–	–	I
/w-/	uậi	–	–	–	–	–	I
/yw-/	–	–	–	–	–	–	
/y-/	–	–	–	–	–	–	
â							
/#-/	âi	âu	âm	ân	âng	â	I
/w-/	uâi	–	–	uân	uâng	uâ	I
/yw-/	–	–	–	–	–	i̯wâ	III*β*
/y-/	–	–	–	–	–	i̯â	III*β*
ə							
/#-/	–	əu	–	ən	əng	–	I
/w-/	–	–	–	uən	uəng	–	I
/yw-/	i̯wəi*β	–	–	i̯wən*β*	i̯wə*k*ɑ	–	III
/y-/	i̯əi*β*	i̯əuɑ	i̯əmɑ	i̯ən*β*	i̯əngɑ	–	III
ʌ							
/#-/	–	–	–	–	ʌng	–	II
/w-/	–	–	–	–	wʌng	–	II
/yw-/	i̯wʌi	–	i̯wʌm	i̯wʌn	i̯wʌng	–	III*β*
/y-/	i̯ʌi	–	i̯ʌm	i̯ʌn	i̯ʌng	–	III*β*
å							
/#-/	–	–	–	–	ång	–	II
/w-/	–	–	–	–	–	–	
/yw-/	–	–	–	–	–	–	
/y-/	–	–	–	–	–	–	
ɛ							
/#-/	–	–	–	–	ɛng	–	II
/w-/	–	–	–	–	wɛng	–	II
/yw-/	–	–	–	i̯wɛn	–	–	III$_{\alpha}$
/y-/	–	–	–	i̯ɛn	–	–	III$_{\alpha}$

The primed symbols above — i′, ai′, and wai′ — indicate finals which were distinguished by different rimes, though there seems to be no direct evidence to determine what the phonetic distinction, if any, may have been. The final -i̯wə*k* happens not to occur with

the nasal ending, except for a rare character found only in *Chí Yün*: ⊙ γi̯wəng.[35]

The overwhelming number of blank spaces in the above distribution charts point to the possibility of further phonemicization. While it may be, as Karlgren once wrote, 'a funny axiom, to say the least of it' that 'the chess-board of 8 x 8 = 64 squares must have every one of the 64 squares filled,'[36] it is surely not too exacting to expect each phoneme's chessboard (of however many squares) at least reasonably filled. The only vowel in which the number of filled positions exceeds (by two) the number of blank ones is ə. The vowel â shares blank and filled positions half and half. All others are to increasing extents defective in distribution.

There are 89 finals in the distribution charts, if we exclude the three primed ones. The numerical distribution of these finals is shown in the following table:

-y	-w	-m	-n	-ng	-#	Total
16	7	9	20	23	14	89

#-	w-	yw-	y-	Total
25	16	21	27	89
	41	37	48	

Translated into approximate percentages, this means that 26% of the finals end in a velar stop or nasal; 23% in a dental; 18% in -y; 16% in zero; 10% in a labial stop or nasal; and 8% in -w. Approximately 59% of the finals have stop or nasal ending (the stops /p, t, k/ are implicit in the columns /m, n, ng/ respectively).

Of the prenuclear 'medials' we find y- in approximately 31% of the finals, zero in 28%, yw- in 23%, and w- in 18%. Thus 41% of the finals are *hó-k'ŏu* in the strict sense of preceded by /w/ (and 3% more if one includes the finals ung, i̯ung, i̯u); the rest are *k'āi-k'ŏu*. Some 54% of the finals may be called *hsì*

[35] The character, for which ⊙ is substituted here, consists of *ĕrh* 'ear' on the left and *yŭn* 'say' on the right. It is apparently onomatopoetic. Cf. *Sùng-pĕn Chí Yŭn* (Yáng-chōu Shīh-chü Edition), 4.25b: ⊙筑冰切耘聲也 'ɕγi̯wəng, pronounced ɕγi̯w[ən ɕpi̯]əng: ɕγi̯wəng-ɕγwəng is a sound.

[36] Karlgren, "Word families in Chinese," *BMFEA*, 5 (1933), 41.

or 'soft' — having a palatal medial (y or yw); 46% are *húng* or 'hard' — without a palatal medial.

46. *Preliminary procedure.* Since the largest number of finals occur with velar endings, it is from this we may judge the number of phonemic distinctions to be posited as a minimum. Dividing 23 by 4, we find 6 the minimal number of distinctive vowels possible. The fact that the distribution by type is well-balanced — #-ng 6, w-ng 5, yw-ng 6, y-ng 6 — supports the likelihood this is the number to be found. In order not to prejudice the case, these six vowels will be referred to by arbitrary numerals as they are discussed and assigned the various finals. We shall proceed from the rime-rich velar finals.

Vowel No. 1 begins with ung, ––, ––, i̯ung; and it is complemented by ––, uong, i̯wong, ––.

To Vowel No. 2 we may assign əng, wəng, i̯wə*k*, and i̯əng with no difficulty; all positions are already filled. Similarly to Vowel No. 3: ʌng, wʌng, iwʌng, iʌng.

For Vowel No. 4 we start with âng, uâng, and find two vacancies. These are admirably filled by i̯wang and i̯ang.

Vowels No. 5 and No. 6 are then to be abstracted from this pattern:

/#-/	ång		ɛng	
/w-/			wɛng	
/yw-/		i̯wäng		iweng
/y-/		i̯äng		ieng

This particular assignment we can defer until the rest of the picture becomes clearer.

Now what are the defining characteristics of the vowel classes posited above? For No. 1, high tongue position; for No. 2, mid-central tongue position; for No. 3, lower mid-central; for No. 4, low. This may be visualized:

.....1.....
.....
2 5, 6 ??
3
....4....

47. *Low vowel phonemes.* Certain of the problems involved here have been the subject of previous discussion. In "Distinctions Within Ancient Chinese," Y. R. Chao pointed out there is no reason why the lonely final ång can not be interpreted as ang, either phonemically or phonetically.[37] Karlgren has since tentatively advanced the date of the phonetic ång to an earlier period, when the vowel was posited for other distributional points as well. The vowel ɛ is the weakest link in Karlgren's system; we shall disregard it for the time being.

If we remove the vowel ɛ from the discussion at this point, reserving judgment on its phonetic status until later, this leaves the entire low front tongue position the domain of the vowel ä. Thus this vowel is not phonetically dissimilar from the vowel a, which is assigned the front-central low position. The distribution is complementary with two exceptions: i̯ang and i̯wang conflict with i̯äng and i̯wäng. But i̯ang and i̯wang are the two finals we saw fit to include with â in Vowel No. 4, set up on the basis of the velar endings alone. There would seem to be no serious objection to a slight phonetic reinterpretation of these finals ('central' perhaps instead of 'front central' low), thus permitting complementary distribution between ä and a, and also rounding out the distribution of â. All of these finals coalesce into Mandarin /-ang/; in Cantonese i̯wang and uâng show a similar vowel treatment (狂 *ghwoang* and 光 *kwoang* respectively), but i̯ang and âng are different (疆 *keung* and 江 *koang*, respectively).

The following arrangement is posited for Vowel No. 5 (front low):

	/-y/	/-w/	/-m/	/-n/	/-ng/	/-#/	(Division)
/#-/	ai, ai'	au	am	an	ang	a	II
/w-/	wai, wai'	–	–	wan	–	wa	II
/yw-/	i̯wäi	–	–	i̯wän	i̯wäng	–	IIIα
/y-/	i̯äi	i̯äu	i̯äm	i̯än	i̯äng	i̯a	IIIα

This phoneme may have included two allophones: a fronted somewhat higher form when preceded by /y/ and not followed by zero; a more central, somewhat lower form elsewhere. In this way, the Karlgren interpretation could be left virtually intact on a phonetic

[37] "Distinctions within Ancient Chinese," pp. 229-30.

level. Note that Ancient ä comes mostly from Archaic [a] preceded by a palatal medial. The raising of the allophone could even be pushed forward to a later date with no harm to statements of historical development.

The pattern of Vowel No. 4 (non-front low) is posited as follows:

	/-y/	/-w/	/-m/	/-n/	/-ng/	/-#/	(Division)
/#-/	âi	âu	âm	ân	âng	â	I
/w-/	uâi	–	–	uân	uâng	uâ	I
/yw-/	–	–	–	–	i̯wangα	i̯wâβ	III
/y-/	–	–	–	–	i̯angα	i̯âβ	III

48. *Karlgren's short low vowels and the mid vowels.* The vowel ậ is interpreted by Karlgren as a short form of the low non-front vowel â; the vowel ạ as a short form of the low non-back vowel a. Karlgren based his length distinctions here primarily on differences in the Sino-Korean orthographic treatment, together with qualitative rather than quantitative differences in modern dialects.[38] The so-called 'short ai' diphthong of Sino-Korean, however, may very well have been a qualitatively rather than quantitatively distinguished unit within the phonemic structure of Ancient Korean, regardless of present interpretation. Korean has evidently had phonemic length distinctions for most vowels in native and borrowed material for some time, though little effort has been made to distinguish these lengths in orthography until modern times. It is quite possible the 'short a' symbol of Sino-Korean orthography may have represented a schwa-like vowel, whose shortness — if any — was intrinsic rather than distinctive.[39] The order in which the classes are distinguished within the respective *shè* in *Kŭang Yùn* are as follows: With âi, ai, and an, the variety Karl-

[38] *Études sur la phonologie chinoise*, p. 633.

[39] On vowel length in modern Korean, see Martin, *Language*, 27 (1951), 522. Vowel length is marked for both Sino-Korean and native elements in the *Khun sacen* [Unabridged Dictionary] of the *Hankul Hakhoy* [Korean Language Society], Seoul 1939 ff. For Sino-Korean elements, the vowel length is correlated with the tone and type of initial in the corresponding syllable of Ancient Chinese. For a historical study of these and related questions, see Kōnō Rokurō, "Onmun kobunken no seiten ni tsuite [Tone marks in ancient Korean literature]," *Chōsen Gakuhō* [*Journal of the Academic Association of Koreanology in Japan*], 1 (1951), 93-140.

gren in each case interprets as short precedes the variety he interprets as long. With âm and am, however, the order is reversed—the first category in the *shè* is long, the second short. The decision in each Karlgren interpretation rested on the presence of *nèi-chŭan* phonetic elements in the graphs of the 'short' variety. Now if the distinctive difference here were really one of length, it seems surprising the compilers of the *făn-ch'ieh* dictionaries should have reversed the order for those with the labial ending, as they did quite consistently throughout each of the tone sections. It is perhaps a little less surprising, however, if one interprets the distinction as qualitative; allophones may account for the difference in order, given a qualitative distinction to start with.

The two vowels ậ and ạ are in complementary distribution, respectively, with the mid-central vowel ə and the lower-mid central vowel ʌ; it would seem feasible from the point of view of synchronic analysis to place them accordingly. On the whole, the Archaic source of ạ, as reconstructed by Karlgren, is higher, usually [ɛ], than that of a, usually [a].

Vowel No. 3 (lower mid-central) will thus include the following rearrangement:

	/-y/	/-w/	/-m/	/-n/	/-ng/	/-#/	(Division)
/#-/	ại	–	ạm	ạn	ʌng	–	II
/w-/	wại	–	–	wạn	wʌng	–	II
/yw-/	i̯wʌi	–	i̯wʌm	i̯wʌn	i̯wʌng	–	IIIβ
/y-/	i̯ʌi	–	i̯ʌm	i̯ʌn	i̯ʌng	–	IIIβ

Vowel No. 2 (mid central) presents this picture: (Spaces marked X will be discussed later.)

	/-y/	/-w/	/-m/	/-n/	/-ng/	/-#/	(Division)
/#-/	ậi	əu	ậm	ən	əng	–	I
/w-/	uậi	–	–	uən	uəng	–	I
/yw-/	i̯wəiβ	–	–	i̯wənβ	i̯wə$k\alpha$	X	III
/y-/	i̯əiβ	i̯əuα	i̯əmα	i̯ənβ	i̯əngα	X	III

One objection to this treatment is that â is a *wài-chŭan* vowel, whereas the ə with which we would class it is *nèi-chŭan*. But the *nèi* and *wài* distinctions are after all classes posited in Sùng times, and the phonemic system we are evaluating was that of Súi, some

four hundred years earlier. By Sùng days, a shift may well have occurred, or presence of allophones may have influenced the division. Presence of *nèi-chŭan* elements in the graphs has already been mentioned.

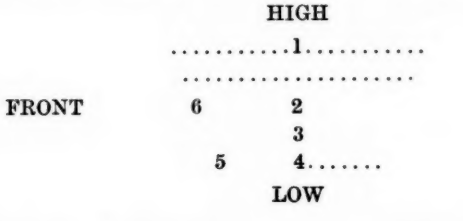
A more serious objection is that this treatment somewhat complicates the relationship between Ancient Chinese and the modern dialects; for the purpose of dialect study, it might be better to place the finals in question with the corresponding finals with â, adding a prime to show our uncertainty about their status: âi′, uâi′, âm′.

But if the dialects are really descended from stages slightly different from that of the *Ch'ieh Yŭn* language, then the treatment suggested earlier would not only fit the synchronic picture, but also relate Ancient to Archaic Chinese more closely (Karlgren reconstructs Archaic ə for Ancient ậ). Moreover, there is some 'minority' evidence from the dialects to support this view: The Wú dialects treat Ancient ậm as [œ] or [œ̃], Ancient ập as [ə$^{?}$]; âm on the other hand becomes [ɛ] or [ɛ̃], âp becomes [ɑ$^{?}$].[40] Note also the Mandarin colloquial reading *hén* for 含 Ancient ɣậm.

Vowel No. 6 (front mid) requires no changes at this time. Positions marked Y will be discussed later.

	/-y/	/-w/	/-m/	/-n/	/-ng/	/-#/	(Division)
/#-/	–	–	–	–	Y	–	
/w-/	–	–	–	–	Y	–	
/yw-/	iwei	–	–	iwen	iweng	–	IV
/y-/	iei	ieu	iem	ien	ieng	–	IV

49. *Remaining problems.* We now have defining characteristics for all six vowel phonemes, and these may be schematized:



[40] Y. R. Chao, *Studies in the modern Wu-dialects.* The nasalized vowels, here irrelevant, occur with perhaps 40% of the examples.

The following vowels, however, have not been assigned to any phoneme: ĕ, i, ɛ. Nor has the full pattern for Vowels No. 1, 2, and 6 been presented.

Turning to Vowel No. 1, we find the vowels u and o appear to be in complementary distribution—o only occurs preceded by /w/, u never so preceded. However, the u finals are usually considered *hó-kʻŏu*, which implies the existence of medial lip action. If one extends the definition of *hó-kʻŏu* to include either rounded or w-preceded vowels, it is possible to put these two vowels together into one phoneme. It should be noted that the u endings have at times been regarded as *kʻāi-kʻŏu*, notably in *Yŭn Chìng* and *Chʻieh Yŭn Chĭh-chăng Tʻú*.[41]

These two non-low back vowels (u and o) occur only preceding the back endings /ng, k/ and zero. With the exception of the two finals iĕ and i̯wĕ, the high front vowel ĕ occurs only before the front endings /w/ and /n/. All three vowels are *nèi-chŭan*. It may be possible to group them together into one phoneme, Vowel No. 1:

	/-y/	/-w/	/-m/	/-n/	/-ng/	/-#/	(Division)
/#-/	–	–	–	–	ung	–	I
/w-/	–	–	–	–	uong	uo	I
/yw-/	Z	–	–	i̯wĕn	i̯wong	i̯wo	IIIα
/y-/	Z, Z	i̯ĕu	–	i̯ĕn	i̯ung	i̯u	IIIα

Moreover, the finals i, iʹ, and i̯wi may be fitted into the spaces marked Z, with the frontness of the vowel attributed to a following (as well as preceding) palatal semivowel: /y-y, yw-y/. Note that these finals come from Archaic vowels ĕ and (mostly) ə; in all instances, Karlgren postulates a stage i̯ĕi in their historical development.[42] It is this stage which best fits the phonemic structure of Ancient Chinese.

[41] Use of the *kʻāi-hó* terms is at variance among the different Sùng sources. Cf. Karlgren, *Études sur la phonologie chinoise*, pp. 612-3, 685. (The 'Yun King' to which Karlgren refers on p. 612 is the *Yün Chīng* 韻經, a work of unknown author and date 'fort en vogue à la fin du XII[e] siècle,' not the *Yŭn Chìng* 韻鏡 mentioned above. Cf. ibid., p. 34.)

[42] Karlgren, "Grammata Serica," *BMFEA*, 12 (1940), 21, 24, 26, 29.

Actually, there is a strong possibility that u and o were not distinguished in the Ch'áng-Ān dialect of Lù Fă-yén's day; Ló Ch'áng-p'éi in his article "On the values of the Ch'ieh Yün rimes i̯wo and i̯u and the ancient dialects on which their distinction was based," *CYYY* 2 (1931), 358-85, comes to the conclusion there was no distinction of these two finals (i̯wo and i̯u) in the dialect of the vast majority of Northern speakers at this time.[43] As noted earlier, the rimes in Kŭang Yŭn seem to be maximally distinctive.

But what of the finals iĕ and i̯wiĕ, which earlier gave trouble in charting syllable structure? The following reinterpretation is suggested: the finals in question are iə and iwə, with perhaps a raised and fronted allophone conditioned by the following zero. The basis for Karlgren's original interpretation was the Foochow form [ie] which seems to occur in the majority cases of the rime in question, and the appearance in Swatow and Amoy of [ia] exclusively in certain cases of this rime.[44] In Archaic Chinese, these finals were mostly ia and i̯wa.[45] In the process of rising from Archaic ia to modern Foochow [ie], there was quite likely an intermediate schwa-like or somewhat mid-central stage, and it is this I would assign to the phonemic system of Ancient Chinese in the places marked X in the chart of Vowel No. 2 above.[46]

There remains the problem of assigning Karlgren's ɛ. The *wài-chŭan* finals ɛng and wɛng can be assigned for the time being to the positions marked Y in the chart of Vowel No. 6 (front mid). It will be noted that there are possible spaces here also for Karlgren's primed ai′ and wai′; like (w)ɛng, (w)ai′ is Division II. This possibility is worth considering, but I leave the matter where Karlgren has left it.

[43] Karlgren himself (*Études sur la phonologie chinoise*, pp. 682, 685, 687) places the amalgamation of the two rimes at a 'date bien ancienne, antérieure même aux tables de rimes des Song.'

[44] Karlgren, *Études sur la phonologie chinoise*, p. 645.

[45] Karlgren, "Grammata Serica," p. 41 etc.

[46] The coalescence of iĕ, i, i′ and (Karlgren's i̯ĕi = Chao's) i̯əi into one final was complete 'déjà de très bonne heure (avant les tables de rimes de Sseu-ma Kouang)' i.e. well before *Ch'ieh Yün Chĭh-chăng T'ú* (c. 1067?). Cf. Karlgren, *Études sur la phonologie chinoise*, p. 648. Cf. also Lín Yŭ-t'áng, "On the ancient pronunciation of the rimes 'Chih' (Nos. 5, 6, 7)," *CYYY*, 2 (1930), 137-52.

The *nèi-chŭan* finals i̯ɛn and i̯wɛn, we may conservatively treat as i̯ĕn′ and i̯uĕn′, the primes indicating uncertainty as to the nature of their distinction from the finals in question; perhaps the distinction was not genuinely synchronic. Karlgren considers ɛ, like ə, 'intrinsically short' at least in Archaic Chinese, since *Shīh Chīng* rimes ən and ɛn, əng and ɛng (and ŭng) quite freely. His reason for choosing the particular phonetic value in question seems to have been an impression that the vowel in the English word *bad* was 'slack' in a manner rather similar to the vowel in 'but' (British [ʌ], not American [ʌ]). See the further discussion in § 54.

5. Vowel phonemes.

51. *The vowel system.* In order to represent the vowels with symbols maximally useful, we may wish to reconsider the chart of defining characteristics presented in § 49. If we interpret Vowel No. 5 as front low, and restrict Vowel No. 4 to the characteristic of BACK low (rather than non-front low), this leaves open the position of central low, and it is possible to move Vowel No. 3 (lower-mid central) down, and reduce the horizontal levels to three, as follows:

.....	1	.....	
6		2	
	5	3	4

We can then use the following symbols:

	*	
e	ə	
	ɛ a	ɑ

Since the symbols i and u are not used, we may substitute these for y and w, thus preserving a little more the look of Karlgren's notations, on the whole.

52. *Distribution and allophones.* The distributional and allophonic features of the six vowel phonemes are recapitulated below.

(1) /*/ High vowel.[48] Back (and probably rounded) when

[47] Karlgren, "Grammata Serica," p. 22.

[48] In a practical notation, this symbol could simply be omitted; in such a case, it would be advisable to write *ng, and perhaps u*ng and u* as ong, uong and uo respectively.

followed by a velar or zero; somewhat lower when also preceded by /u-/. Front when followed by endings other than velar or zero; possibly somewhat higher when followed by /-i/.

–	–	–	–	*ng	–
–	–	–	–	u*ng	u*
iu*i	–	–	iu*n, iu*n′	iu*ng	iu*
i*i, i*i′	i*u	–	i*n, i*n′	i*ng	i*

(2) /ə/ Mid central. Possibly higher and fronter when followed by zero.

əi	əu	əm	ən	əng	–
uəi	–	–	uən	uəng	–
iuəi	–	–	iuən	iuək	iuə
iəi	iəu	iəm	iən	iəng	iə

(3) /a/ Low central.

ai	–	am	an	ang	–
uai	–	–	uan	uang	–
iuai	–	iuam	iuan	iuang	–
iai	–	iam	ian	iang	–

(4) /ɑ/ Back low.

ɑi	ɑu	ɑm	ɑn	ɑng	ɑ
uɑi	–	–	uɑn	–	uɑ
–	–	–	–	iuɑng	iuɑ
–	–	–	–	iɑng	iɑ

(5) /ɛ/ Front low. Perhaps more front and high when preceded by /i(u)-/.

ɛi, ɛi′	ɛu	ɛm	ɛn	ɛng	ɛ
uɛi, uɛi′	–	–	uɛn	–	uɛ
iuɛi	–	–	iuɛn	iuɛng	–
iɛi	iɛu	iɛm	iɛn	iɛng	iɛ

(6) /e/ Front mid.

–	–	–	–	eng	–
–	–	–	–	ueng	–
iuei	–	–	iuen	iueng	–
iei	ieu	iem	ien	ieng	–

53. *Inner and Outer Series.* The meaning of *nèi* and *wài* series has been explored by Ló Ch'áng-p'éi, who concludes the *nèi-chŭan* finals contained closer nuclear vowels than those in the *wài chŭan.* With the phonemic reduction made above, we may say the vowels /*/ and /ə/ are typically *nèi*, the other four *wài.*

The *wài-chŭan* and *nèi-chŭan* finals may be arranged as on p. 38.[49]

54. *The primed finals.* Considerations based on the Sùng rime tables must be interpreted as the result of observations made as much as four centuries after the rimes were definitively grouped, as we have noted. But a closer look at the phonetic divisions Ló has made shows an interesting trend: the line between *nèi* and *wài* descends somewhat from front to back. Thus Karlgren's e (the long variety) is below, in the *wài* group, but his o is in the *nèi* group, above the line. Moreover, ə is typically *nèi*, yet represents a somewhat lower tongue position than e and o. So the line between *nèi* and *wài*, so far as it corresponds to some phonetic reality, may be said to pass somewhere above /a/ and below /ə/. Now if we were to posit /iɑn/ and /iuɑn/ — the only blanks available in our system — for Karlgren's i̯ɛn and i̯wɛn, noted as /i*n′/ and /iu*n′/ above, this would then be the only occurrence of the phoneme /ɑ/ preceded by i(u)- and also followed by a front consonant. Influenced by preceding palatal and following dental, this vowel might very well have occurred in a higher allophone. And, since that back low area of the mouth is subject to a sort of acoustic black-out when it comes to distinguishing qualities,[50] the allophone was probably more forward as well: [ɑ < ^] or [ə > ˅]. This, I think, would provide a plausible explanation for inclusion of these finals in the *nèi* series, rather than the *wài* to which the nuclear vowel phoneme /ɑ/ would otherwise belong. An alternative explanation, expanding the scope of /ɑ/ to include most of the back unrounded range, would be an allophone [ʌ^] or even

[49] Cf. Chao, "Distinctions within Ancient Chinese," pp. 232-3, Tables 3A and 4A, in which the following typographical corrections should be made at the bottom of p. 232: ʌng, ɛng, wʌng, wɛng, iwʌng each should be moved up one line respectively; iʌng should be moved up one line and right one column.

[50] Martin Joos, *Acoustic Phonetics*, Language Monograph No. 23, Baltimore 1948, p. 83, § 3.53-4.

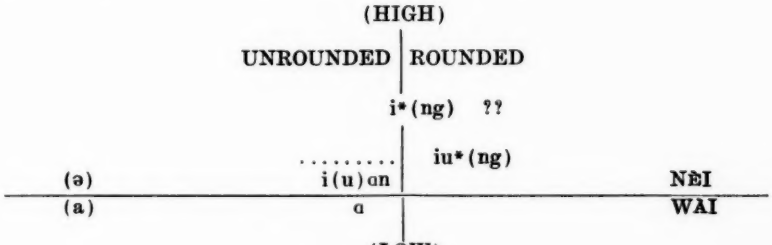
WÀI GROUPS

	K'ĀI-K'ŎU					Hó-K'ŏU				
Division:	I	II	IIIα	IIIβ	IV	I	II	IIIα	IIIβ	IV
Group										
KŬO-CHĬA	ɑ	ɛ	iɛ	iɑ	–	uɑ	uɛ	–	iuɑ	–
HSIEH	əi	ai	iɛi	iai	iei	uəi	uai	iuɛi	iuai	iuei
	ɑi	ɛi	–	–	–	uɑi	uɛi	–	–	–
		ɛi′					uɛi′			
HSIAO	ɑu	ɛu	iɛu	–	ieu	–	–	–	–	–
HSIEN	əm	am	iem	iam	iem	–	–	–	iuam	–
	ɑm	ɛm								
SHĀN	ɑn	an	ien	ian	ien	uɑn	uan	iuɛn	iuan	–
		en					uɛn			
TÀNG-CHĪANG	ɑng	ɛng	iɑng	–	–	uɑng	–	iuɑng	–	–
KĚNG	–	ang	ieng	iang	ieng	–	uang	iuɛng	iuang	iueng
		eng					ueng			

NÈI GROUPS

	K'ĀI-K'ŏU			Hó-K'ŏU		
Division:	I	IIIα	IIIβ	I	IIIα	IIIβ
Group						
YÙ	–	–	–	u*	iu*	–
					i*	
CHĬH	–	i*i	iəi	–	iu*i	iuəi
		i*i′				
		iə			iuə	
LÍU	əu	iəu	–	–	–	–
		i*u				
SHĒN	–	iəm	–	–	–	–
CHĒN	ən	i*n	iən	uən	iu*n	iuən
		i*n′			iu*n′	
TSĒNG	əng	iəng	–	uəng	iuə*k*	–
T'ŪNG	–	–	–	*ng	i*ng	–
				u*ng	iu*ng	

[ɣ], so that the *chŭan* difference would be one of tongue height alone, while the phoneme distinctions would be in part perhaps a matter of rounding versus unrounding. A scheme of the back allophones alone — to be placed, if at all, perhaps at a time intermediate between the Súi phonemic system and the composition of the Sùng rime tables — would look like this:



This hypothesis would also suggest a quite analogous place for i*i′ (Karlgren's i′)—that of /iɑi/, with the allophone conditioned as above. In this way, it would be possible to take care of all the primed occurrences in a strictly synchronic system. The disadvantages in applying these revisions to diachronic study, however, probably justify retention of the primes.

55. *Vowel length.* We have reduced Karlgren's complex vowel system to one of six fairly well distributed phonemes. Can we regard the differences in quality between sets of these phonemes as phonemic differences of length? The question of length as a distinctive feature in Ancient Chinese is difficult to approach. Some dialects, e. g. Cantonese, have length as a distinctive feature; but a systematic correlation of length in the various dialects has not been made. Karlgren based his few length distinctions in Ancient Chinese largely on quality distinctions in the dialects.

Chao has suggested[51] that *nèi-chŭan* /ə/ may be the phonemically short variety of the *wài-chŭan* /a/. Can *wài-chŭan* /e/ similarly be considered a long variety of *nèi-chŭan* /*/? The range of the phoneme /*/ is already overwhelming in terms of phonetics, but the basic or 'non-conditioned' form in which the phoneme appears may be posited as the lower-high front unrounded

[51] "Distinctions within Ancient Chinese," p. 228.

allophone, and it would not be out of the question to consider this the phonemically 'short' form of the somewhat lower *wài-chŭan* phoneme /e/, just as Karlgren considers his ĕ the short variety of his e. For /ɛ/ and /ɑ/ it might be possible to assume one variety the long counterpart of the other; however, both vowels are within the *wài chŭan* and there seems to be no phonetic evidence of distinctive length to guide the selection. Such a solution—reducing the vowel system to three phonemes and a feature of length — is rather attractive in its drastic simplicity, but it must be rejected for lack of phonetic justification. It is worth considering, however, as an arbitrary orthographic device for the notation of Ancient readings.

6. Vowel quality and dentilabialization.

61. *Development of the labiodentals.* The circularity of Karlgren's conditions for dentilabialization — 'primary' versus 'secondary' *hó-k'ŏu* of labials — has been discussed by Y. R. Chao,[52] whose conclusion is that labials neutralize the *k'āi* and *hó* distinctions. If these distinctions are not the source of the dentilabialization, this must then be sought elsewhere. Chao suggests that labials before i + a central or back vowel change into labiodentals, but he notes difficulties to be met before this theory can be accepted.

Chao feels there must have been something present in the phonemic structure of Ancient Chinese to account for the later development of the labiodentals. The timing of this development is not altogether clear, however, and it is quite possible a phonemic set-up at some time not readily accessible may be responsible for the difficulties. Of the labiodental development, Karlgren has this to say:[53]

> L'âge du développement $p > f$ etc. ne se laisse guère determiner exactement. Dans les tables de rimes de Sseu-ma Kouang (XI^e siècle) le système nouveau est appliqué. Dans les fan-ts'ie due Ts'ie Yun (vers 600 apr. J. Chr.) et dans le système d'initiales le plus ancien (celui des 30 initiales), il n'y a que des bilabiales. L'évolution a donc été achevée à l'époque des T'ang. Bon nombre de transcriptions datant de cette époque deviennent

[52] "Distinctions within Ancient Chinese," pp. 223-7.

[53] *Études sur la phonologie chinoise*, pp. 553-4.

cependant plus heureuses si l'on substitue des valeurs dentilabiales, et bien que ceci ne soit point une preuve concluante, le plus naturel sera néanmoins de dater l'évolution $p > f$ du commencement de l'époque des T'ang. [Footnote:] C'est là la proposition judicieuse de M. Maspero dans les passages importants, Phonét. Ann. pp 14 et 39. D'ailleurs la transition ne s'est naturellement pas produite tout d'un coup, ni simultanément dans toutes les parties de la Chine où elle a eu lieu. Il a fallu un temps assez long pour son achèvement.

62. *Allophonic distribution.* An examination of the difficulties mentioned by Chao shows the following features under the phonemic reduction made earlier. The front phonemes /e, ɛ/ never induce dentilabialization. The phoneme /ɑ/ is somewhat limited in distribution within the /i-/ and /iu-/ columns: /iuɑ/ and /iɑ/, which are rather rare anyway, do not occur preceded by labials. The remaining occurrences, /iɑng/ and /iuɑng/ (Karlgren's i̯ang and i̯wang), show dentilabialization, as would be expected (e. g. 方 *fāng*).

With the phoneme /*/ it is a matter of the front and back allophones:

iu*i	–	–	iu*n	iu*ng 封	iu*
i*i	i*u	–	i*n	i*ng 風	i* 夫

No labials occur with /iu*/ (Karlgren's i̯wo), so it pairs as expected with */i*/* — no distinction of /-u-/ after labials. The finals */iu*ng/* and */i*ng/* do present an anomaly, however, if /-u-/ is to be synonymous with *hó-k'ŏu* for purposes of the immediate discussion. Perhaps by the time the labiodentals were phonemically distinct, these two finals had already coalesced throughout.

The vowel /ə/ provides a more difficult scheme:

iuəi / iəi 痱	–	–	iuən / iən 分	iuək	iuə
	iəu 否	iəm		iəng	iə

Even if we choose to disregard i(u)əng and i(u)ə — Karlgren's (i̯w)iĕ — the final iəm stands out in the midst of dentilabialization. Chao suggests iəm and iəng may have been i̯ĕm and i̯ĕng right before the dentilabialization set in. There is a blank for /i*m/ in the distribution charts, and /i*ng/ may have been blank, if i̯ung and i̯wong had coalesced by the time in question. The finals i(u)ə need not disturb us; a fronted allophone has already been suggested, if these were not yet coalesced with /i(u)*i/.

There is some evidence that in a number of dialects (excluding Cantonese) Ancient Chinese /ə/ corresponds to a modern high vowel when not preceded by a palatal or labial or when preceded by a labial and followed by /m, ng/ or zero; yet when followed by /i, u, n/ the correspondence, for labial and non-labial alike, seems to be a mid vowel. Compare for example:

Ancient	Examples	Mandarin
/-iəm/	品 (林,今)	/-in/
/-iəng/	永 (應,興)	/-ing/
/-iə/	皮 (離,奇)	/-i/
/-iuəi/	非 (歸,威)	/-uei/
/-iəu/	否 (流,九)	/-ieu/
/P-iuən/	分	/F-en/

A similar set-up may be observed with /a/:

iuai / iai	廢	– / –	iuam / iam	凡	iuan / ian	反	iuang / iang	– / –

In many dialects (including Cantonese) there is a higher and more fronted vowel (→ i) for the non-dentilabializing -iuang words than for other -iua- words (→ a). E. g.:

Ancient	Examples	Mandarin	Cantonese
/-iuang/	兵	/-ing/	/-eng/
/-iuan/	反	/-an/	/-aan/

Now is it possible that the dentilabials may not have 'jelled' in the language until some later point, when the vowel structure had been altered somewhat? It should be noted that the labiodentals could not have been phonemically distinct so long as the *Ch'ieh Yün* vowel system was intact, for the appropriate finals would have been in complementary distribution with the finals which did not evidence dentilabialization in later stages. It is well worth noting that the phonetic labiodental [f] of Cantonese even today may perhaps be analyzed phonemically as /hw/, though the conflicting instance of the interjection *xwoai* [hwɔ:i] probably indicates the dentilabial is already jelled; perhaps we can expect to find new words with [hw-] initials distinct from [f-] in coming generations of Cantonese speech.

It may be that labiodentals were in free variation with labials for a long period, before -iuang etc. as well as those finals before which the labiodentals solidified into the phonemic structure; perhaps by the time this modification was complete, the finals in question had shifted at least allophonically and were no longer subject to the labiodental free variation. The jelling process may very well have taken place at various times and stages in different dialects after the time of Ancient Chinese.

63. *Conclusion.* Within the system of Ancient Chinese we fail to find a clear-cut allophonic distinction for the labiodental development. This being the case, the most useful notation for dialect comparison is, as Chao suggests, writing *hó-k'ŏu* after labials for those finals which later show labiodental initials. This means introducing a final -iuəu, not otherwise present; and retaining -iuam, which is theoretically superfluous, since it occurs only with labials, whereas -iam does not occur with them. But in using such a notation, the circularity of its origin must not be forgotten; it might be better simply to write f, fɦ, fh, and fm (or vm), and note the finals in their simpler forms, with reduction of the superfluous -iuam.

7. Summary. The phonemic analysis made in this paper can be summarized in three tables: a syllable structure chart, a table of the Karlgren-Chao finals rearranged according to the phonemic interpretation, and a summary list of the phoneme equivalents of the Karlgren vowels.

SYLLABLE STRUCTURE

INITIAL		FINAL				
		(MEDIAL)		(NUCLEUS)	(POST-NUCLEUS)	(TONE)
q m l ng		–	–	* e ə ɛ a ɑ	– p t k m n ng i u	1 2 3 4
– p k t, tj c, cj, cr s, sj, sr	h	i	u			
n	ɦ –					

TABLE OF FINALS

		-i	*-u*	*-m*	*-n*	*-ng*	*-*
/*/	–	–	–	–	–	ung	–
	u-	–	–	–	–	uong	uo
	iu-	i̯wi	–	–	i̯wĕn, i̯wɐn	i̯wong	i̯wo
	i-	i, i'	i̯ĕu*	–	i̯ĕn, i̯ɐn	i̯ung	i̯u
/ə/	–	ə̤i	əu	ə̤m	ən	əng	–
	u-	uə̤i	–	–	uən	uəng	–
	iu-	i̯wəi*	–	–	i̯wən	i̯wək	i̯wiĕ
	i-	i̯əi*	i̯əu*	i̯əm	i̯ən	i̯əng	iĕ
/a/	–	a̤i	–	a̤m	a̤n	ʌng	–
	u-	wa̤i	–	–	wa̤n	wʌng	–
	iu-	i̯wʌi	–	i̯wʌm	i̯wʌn	i̯wʌng	–
	i-	i̯ʌi	–	i̯ʌm	i̯ʌn	i̯ʌng	–
/ɐ/	–	ai, ai'	au	am	an	ang	a
	u-	wai, wai'	–	–	wan	–	wa
	iu-	i̯wäi	–	–	i̯wän	i̯wäng	–
	i-	i̯äi	i̯äu	i̯äm	i̯än	i̯äng	i̯a
/ɑ/	–	âi	âu	âm	ân	âng	â
	u-	uâi	–	–	uân	uâng	uâ
	iu-	–	–	–	–	i̯wang	i̯wâ
	i-	–	–	–	–	i̯ang	i̯â
/e/	–	–	–	–	–	ɛng	–
	u-	–	–	–	–	wɛng	–
	iu-	iwei	–	–	iwen	iweng	–
	i-	iei	ieu	iem	ien	ieng	–

* Chao: i̯ĕu i̯əu i̯əi i̯wəi

Karlgren: i̯əu i̯ĕu i̯ĕi i̯wĕi

LIST OF EQUIVALENTS FOR VOWELS

KARLGREN-CHAO NOTATION		PHONEMES
1.	i, alone	/i*i/
1a.	i, elsewhere	/i/
2.	i̯	/i/
3.	u, alone or preceded by i and followed by zero	/*/
3a.	u, elsewhere	/u/
4.	o	/*/
5.	ĕ, except in (i̯w)iĕ	/*/
5a.	(i̯w)iĕ	/i(u)ə/
6.	e	/e/
7.	ä	/ɛ/
8.	a, except in i̯(w)ang	/ɛ/
8a.	i̯(w)ang	/i(u)ɑng/
9.	a̤	/a/
10.	a	/ɛ/
11.	â	/ɑ/
12.	â̤	/ə/
13.	ə	/ə/
14.	ʌ	/a/
15.	i̯(w)ɛn	/i(u)*n'/
16.	(w)ɛng	/(u)eng/